

Appl.No.: 09/832,410
Corrected Amendment Section dated April 5, 2005
Response to Notice mailed March 8, 2005

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (original) A method of wireless communication, comprising:

- (a) estimating at least one eigenvector of a matrix of communication channel coefficients for a channel between a first plurality of antennas and a second plurality of antennas; and
- (b) transmitting using said first plurality of antennas with the relative weightings of baseband signals on said first plurality of antennas corresponding to components of said at least one eigenvector.

Claim 2 (currently amended) The method of claim 1, wherein:

- (a) (c) said communication channel has MN coefficients, a_{ij} for $i = 1, \dots, M$ and $j = 1, \dots, N$ where M and N are positive integers, and a_{ij} relates to transmission from the i th antenna of a transmitter to the j th antenna of a receiver, and said matrix is CC^H where C is the $M \times N$ matrix with i th row and j th column entry a_{ij} and H is Hermitian conjugate.

Claim 3 (currently amended) The method of claim 2, wherein:

- (a) (d) said signals on said antennas are a superposition of first signals weighted according to a first eigenvector of CC^H plus second signals weighted according to a second eigenvector of CC^H wherein the superposition depends upon first and second eigenvalues of CC^H .

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Claim 4 (currently amended) The method of claim 3, wherein:

(a) (e) number of bits allocated between said first signals and said second signals depends upon the ratio of said first eigenvalue and said second eigenvalue.

Claim 5 (original) A method of wireless communication, comprising:

(a) estimating eigenvectors of a matrix of communication channel coefficients between a transmitter with M antennas (M an integer greater than 1) and a receiver with N antennas (N an integer greater than 1); and

(b) transmitting on said communication channel baseband signals x_1, \dots, x_K (K a positive integer) with the relative weightings of each of said signals among said antennas corresponding to components of a linear combination of said eigenvectors of said matrix;

(c) wherein said linear combinations of said signals maximize the minimum distance between received different signals at a receiver.

Claim 6 (currently amended) The method of claim 5, wherein:

(a) (d) said communication channel has MN coefficients, a_{ij} for $i = 1, \dots, M$ and $j = 1, \dots, N$, and relates to transmission from the i th antenna of a transmitter to the j th antenna of a receiver, and said matrix is CC^H where C is the $M \times N$ matrix with i th row and j th column entry a_{ij} and H is Hermitian conjugate.

Claim 7 (currently amended) The method of claim 5, further comprising:

(a) (d) repeating step (c) of claim 5 for a plurality of distributions of constellations of symbols where each of said signals includes a symbol of a constellation as a factor for a corresponding linear combination; and

(b) (e) using for said transmitting of step (b) of claim 5 the distribution of constellations and corresponding linear combinations from step (a) (d) of this claim which has a largest maximum.

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Claim 8 (currently amended) The method of claim 5, wherein:

(a) (d) each of said linear combinations has a single nonzero coefficient with a one-to-one relation between said K signals and K of said eigenvectors.

Claim 9 (original) A transmitter, comprising:

(a) antennas A₁, ..., A_M where M is a positive integer greater than 1;
(b) a channel analyzer coupled to said antennas and operable to estimate eigenvalues and eigenvectors of an M x M matrix derived from coefficients of a communication channel from said antennas to a receiver;
(c) a signal generator coupled to said antennas and to said channel analyzer and operable to apply signals S₁, ..., S_M to said antennas A₁, ..., A_M, respectively; wherein said signals are proportional to the components of a linear combination of said estimated eigenvectors.

Claim 10 (currently amended) The transmitter of claim 9, wherein:

(a) (d) said channel analyzer is operable to compare the magnitudes of a first eigenvalue and a second eigenvalue; and
(b) (e) said signal generator allocates bits to be transmitted between first signals S'1, ..., S'M and second signals S"1, ..., S"M according to the results of step (a) an output of said channel analyzer, wherein said first signals S'1, ..., S'M are transmitted according to the components of said first eigenvector and said second signals S"1, ..., S"M are transmitted according to the components of said second eigenvector and the signals S₁, ..., S_M include the sums S'1+S"1, ..., S'M+S"M, respectively.

Claim 11 (currently amended) The transmitter of claim 9, wherein:

(a) (d) when said communication channel connects said antennas A₁, ..., A_M with antennas B₁, ..., B_N of a receiver for N a positive integer, said M x M matrix is CC^H where C is an M x N matrix with element m,n an estimate of a channel

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coefficient from antenna Am to antenna Bn, and where C^H is the Hermitian conjugate of C.

Claim 12 (currently amended) The transmitter of claim 9, wherein:

(a) (d) said signal generator includes information of constellation distributions and linear combinations of eigenvectors in terms of eigenvalues.